

Claims:

1. A robotic joint comprising:

a first bay;  
a first cup rotatably connected to the first bay;  
a second cup rotatably connected to the first cup;  
a second bay rotatably connected to the second cup; and  
a gear train connected to the first bay and the second bay;

wherein the relative orientation of the first and second bays is preserved when the first cup rotates relative to the second cup.

2. The robotic joint of claim 1, wherein the gear train comprises:

a first bevel pinion;  
a first bevel gear mating the first bevel pinion;  
a second bevel gear fixedly connected to the first bevel gear; and  
a second bevel pinion mating the second bevel gear;

wherein the first bevel pinion is fixedly connected to the first bay, and the second bevel pinion is fixedly connected to the second bay.

3. The robotic joint of claim 2, wherein the gear train further comprises a bevel gear bearing having an internal ring and an external ring, the internal ring being fixedly connected to at least one of the first and second bevel gears.

4. The robotic joint of claim 3, wherein the external ring of the bevel gear bearing is fixedly connected to the second cup.

5. The robotic joint of claim 4, wherein:

(a) the first bay and the first cup are rotatably connected with a first pair of bearings, the first pair of bearings having a first pair of internal rings and a first pair of external rings, the first pair of internal rings being fixedly connected to the first cup and the first pair of external rings being fixedly connected to the first bay, whereby the first pair of bearings allow the first bay to rotate relative to the first cup about a common axis of rotation; and

(b) the second bay and the second cup are rotatably connected with a second pair of bearings, the second pair of bearings having a second pair of internal rings and a second pair of external rings, the second pair of internal rings being fixedly connected to the second cup and the second pair of external rings being fixedly connected to the second bay, whereby the second pair of bearings allow the second bay to rotate relative to the second cup about a common axis of rotation.

6. The robotic joint of claim 5, further comprising:

- (a) a first spur gear fixedly connected to the first cup;
- (b) a first spur pinion gear mating the first spur gear;
- (c) a first motor shaft fixedly connected to the first spur pinion gear and having a common axis of revolution therewith;
- (d) a first minor bearing having an internal ring and an external ring, the internal ring being fixedly connected to the first motor shaft, the external ring being fixedly connected to the first bay;
- (e) a second spur gear fixedly connected to the second cup;
- (f) a second spur pinion gear mating the second spur gear;
- (g) a second motor shaft fixedly connected to the second spur pinion gear and having a common axis of revolution therewith; and
- (h) a second minor bearing having an internal ring and an external ring, the internal ring being fixedly connected to the second motor shaft, the external ring being fixedly connected to the second bay;

whereby a rotation of the first motor shaft induces a rotation of the first cup with respect to the first bay, and a rotation of the second motor shaft induces a rotation of the second cup with respect to the second bay.